blockchain beyond the hype -
what we learned since 2017

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Stuck at the end of the peak

https://www.gartner.com
Overview – What is Blockchain?
"an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way."

Iansiti, Marco; Lakhani, Karim R. (January 2017)

"Decentralized, chronologically updated database with a network-based consensus mechanism, used for the permanent securitization of property rights."

Gabler Wirtschaftslexikon, translated from German

"The Slowest (and most Fascinating) Database in the World"

Stefan Tilkov
Mining based Blockchain

- **Block n-1**
  - Hash
  - Txs
  - Can easily verify validity of existing transactions

- **Block n**
  - Hash
  - Txs

- **Tx Pool**

- **Non-mining Nodes**

- **New Transactions**

- **Verification of new transactions, solving a cryptographic puzzle to mine new block (PoW)**

- **Mining Nodes**
Programmable Blockchain

Ethereum Smart Contracts

Adapted from https://www.sciencedirect.com/science/article/pii/S0167739X17318332
Where do we come from, where do we go?
2015 - 2019: Blockchain Community Stuttgart

2015
- blockLAB
  Gründung blockLAB

2016
- Meetup Blockchain Stuttgart

2017
- Blockchain Camp
- Region Stuttgart

2018
- WG Blockchain
  Baden-Württemberg
  BC-Strategie für Baden-Württemberg

2019
- Meetup Blockchain Stuttgart
- Gründung Special Interest Group Blockchain bwcon
- 1. BC-Hackathon Stuttgart
- IHK Region Stuttgart
- Blockchain Stuttgart Week
- BCFF Blockchain Future Festival
Some of our projects...
Project: Diamond asset backed token - ERC-721 (NFT)

Value transfer and storage

- Cryptocurrencies
- Crowdfunding
- Tokenization (of real assets)
- ICOs
Token classification

Classification of Cryptoassets

1. Currencies & Commodities
2. Utility Tokens
3. Security Tokens

- Store of Value Tokens
  - Stablecoins
  - Payment Tokens
- Governance Tokens
  - Discount Tokens
  - Pure Work Tokens
- Work Tokens
  - Token Curated Registries
- Burn & Mint Tokens
  - Access-based Tokens

Ethereum token standards exhaustive list

List of Ethereum Tokens Standards

- ERC-20 : Standard Token
- ERC-223 :
- ERC-667 : transferAndCall Token Standard
- ERC-721 : Non-fungible Token Standard
- ERC-777 : Operator Based Token Standard
- ERC-899 : Renting Standard for Rival, Non-Fungible Tokens
- ERC-827 :
- ERC-864 : Related to #981
- ERC-865 : DelegatedTransfer (Related to #965)
- ERC-874 : Weighted Non Fungible Tokens
- ERC-918 : Mappable Token Standard
- ERC-965 : sendByCheque (Related to #964)
- ERC-981 : Barter Token Standard
- ERC-994 : Delegated Non-Fungible Token Standard
- ERC-996 :
- ERC-998 : Composable Non-Fungible Token Standard
- ERC-1003 : Safe Transfer To Contract Extension

ERC-20 : Standard Fungible Token (EIP-20)

Standard API for fungible tokens, including transfer and balance tracking functionalities.

ERC-721 : Non-fungible Token Standard (EIP-721)

While fungible tokens can be divided, non-fungible tokens (NFTs) can not. NFTs can be owned and transacted by individuals as well as consigned to third party brokers/wallets/auctioneers (“operators”). NFTs can represent ownership over digital or physical assets.

ERC-864 : NFTs Shared Ownership (ERC-864)

This proposal aims to enable shared ownership of NFTs natively in the NFT contract.

Related to:
- EIP-721

Strongly related to:
- ERC-981

ERC-981 : Partial Ownership Standard (ERC-981)

This proposal serves to describe a new Ethereum Interface for issuing tokens for asset owners who come to a marketplace with a finite quantity of their asset to trade, representing 100% ownership of that particular issue. They then choose to divide the asset into divisible units that increase fungibility of that asset.

Related to:
- EIP-721

Strongly related to:
- ERC-864.

https://github.com/PhABC/ethereum-token-standards-list/blob/master/README.md
What is a non-fungible token (NFT)?

FUNGIBLE
Ex: FunFair tokens (ERC20)

1 FUN 1 FUN

NON-FUNGIBLE
Ex: CryptoKitties (ERC721)

Kitty #529553  Kitty #529543

Kitty #529537  Kitty #529571

https://twitter.com/toddg777/status/965795801279512576
Asset-backed token - basic model

**Underlying Asset**
- Tangible
- (Unique)
- (Identifiable)
- (Valuable)

Money in exchange for asset ownership

Asset-backed token
Technical framework for a non-fungible asset-backed token
# Untitled Inc. token classification framework - tokenized asset

| **Crypto-currency** | Used as store-of-value or means-of-payment; unit of account  
| Not issued by a central authority  
| Can be mineable or pre-mined |

| **Tokenized Asset** | Gives access to assets like gold, even in a micro transaction scale  
| The underlying asset needs to be held by the issuing party  
| Thus introduces counterparty risk, contrary to cryptocurrency |

| **Tokenized Platform** | Platform-like network, not owned & operated by a single entity  
| Before users had limited roles in a platform, now roles are distributed and available to every network participant  
| Value (financial/utility) flows freely through the network |

| **Token-as-a-share** | A tokenized instrument to invest in companies (though currently on no regulated basis) that has characteristics of stock and currency (e.g. ICO replacing IPO)  
| Shares on steroids: flexible, programmable via smart contract  
| Currently a highly uncertain token class as regulatory frameworks are only beginning to emerge |

- Gas grid operator of Baden-Württemberg
- Process for ordering gas throughput capacities by other network operators (public utilities, companies)
- Disclosure requirements were enriched by storing relevant steps of the process in the public Ethereum main net
CC Architecture

Existing Systems

SOAP Service

Oracle DB

MS Exchange

Public Ethereum Blockchain

Linux Server (virtualised)

HTTP Server

nginx

REST Service

Spring Boot

System Wallet

web3j

Web UI

Angular

SOAP

JDBC/ JPA

SMTP
CC Token Transfers
Critical Appraisal

**PRO**
- Real-life use case
- Goes live on Ethereum main net in May
- Potential for further use cases
  - capacity trading
  - connect gas network operators from source to end consumer

**CON**
- Blockchain only small part (<10%) of solution
- Had to work around limitations
  - Transaction queue
  - Failover mechanism
  - Admin user interface for control and recovery
Ongoing project: Tokenisation of industrial investment goods
What if you combine ICOs...

https://www.coindesk.com/ico-tracker
... with industrial assets?

Industrielles Investitionsgut, integrierter Chip

Smart Contract, Blockchain

Token, Anlegerwallet

Anleger
Which role will the Stuttgart region play?
Further Projects and Topics

- Mileage2blockchain: trustable vehicle mileage
- Blockchain-based Digital Rights Management
- Study Blockchain in Supply Chain Management
- Concept for Blockchain based traceability of Intellectual Property
- Tokenization of Real Estate
- Review of Mobility Platform Prototype based on Stellar
- ...
Where does blockchain make sense?
“ [...] the ability to create something that is not duplicable in the digital world has enormous value.”

Eric Schmidt, CEO of Google
The 3 dimensions of blockchain innovation

1. technological
   - blockchain-technology
   - decentral, P2P network
   - immutable ledger
   - consensus algorythem
   - protocol economy

2. social
   - open-source
   - community driven technology
   - cryptography

3. economical
   - tokenisation
   - incentivation
   - „internet of value“
   - cryptocurrencies

"internet of value"
Blockchain P2P networks as future economic infrastructure?

Blockchain-basierter Integration Ledger

1. Service
2. Solarm
   - Asset
3. Börse
   - Service
   - Asset
   - Service

Outlook and Current Trends
Blockchain/DLT Implementations

2nd generation

- Ethereum
- NEO
- NEM
- Bitcoin
- Ripple
- Stellar

3rd generation

- EOS
- Cardano
- Aeternity
- Corda
- Symbiont

DAG based

- Byte
- IOTA
- Hashgraph
- Hyperledger
- Cosmos

Blockchain inspired enterprise ledgers
Second Layer Technologies

- Smart solutions on top of existing base blockchain

**State Channels**
- Lightning Network (BTC)
- Raiden (ETH)
- Counterfactual (ETH)

**Side Chains**
- Plasma (ETH)
- POA Network (ETH)

**Off-Chain Computation**
- TrueBit (ETH)

**Blockchain Platforms**
- RSK / Rootstock (Bitcoin)
- Blockstream Elements (Bitcoin)
- Agoric (ETH)
Ethereum 2.0

- Series of updates to Ethereum to make it *faster and better*
- Final stage *Serenity* 2019-2021

- **Proof of Stake (PoS)**
  - Beacon Chain, Casper FFG

- **Sharding**

- **eWASM**
Blockchain Bridging

[Diagram of Polkadot ecosystem showing Collators, Parachains, Relay Chain, and Validators connected to Bridges.

Diagram of Cosmos ecosystem showing multiple Zones and Nodes, including Hub1 and Hub2, with connections to Ethereum, Bitcoin, and other blockchains.

https://polkadot.network/technology.html

https://cosmos.network/intro]
Thank you

Questions ? & Discussion !

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Backup
Blockchain in the Stuttgart Region

Beratung und Implementierung
- targens
- 51nodes
- KI decentralized
- GFT
- IBM
- JURIBO
- compacer
- GIU

Organisationen und Veranstaltungen
- blockLAB
- IHK Region Stuttgart
- Blockchain Camp III
- BLOCKCHAIN HACKATHON
- CRYPTO MONDAY

Blockchain Projekte
- Boerse Stuttgart
- PORSCHE
- BOSCH
- SOWALABS
- DAIMLER
- LB BW
- EnBW

- BISON App
- Schuldverschuldungsprozess
- mobIDIN
- Schuldverschuldungsprozess

Source: www.blocklab.de
What is a token?

Ethereum tokens can represent anything from a physical object like gold (Digix) to a native currency used to pay transaction fees (Golem).

The properties and functions of each token are entirely subject to its intended use.

https://blog.coinbase.com/a-beginners-guide-to-ethereum-tokens-fbd5611fe30b
Remember? Development of the World Wide Web

1989

Akustikkoppler Typ AM211


2019


https://www.pexels.com/photo/uber-smartphone-iphone-app-34239/
Where will blockchain be in 30 years?

2008

https://bitcoin.org/bitcoin.pdf

2038